Note: Performing your original search, *vacanti heart valves sheep*, in PubMed will retrieve *13* citations.

1: Ann Thorac Surg. 1995 Dec;60(6 Suppl):S513-6.

Tissue engineering heart valves: valve leaflet replacement study in a lamb model.

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BACKGROUND. Valve replacements using either bioprosthetic or mechanical valves have the disadvantage that these structures are unable to grow, repair, or remodel and are both thrombogenic and susceptible to infection. These characteristics have significantly limited their durability and longevity. In an attempt to begin to overcome these shortcomings, we have tested the feasibility of constructing heart valve leaflets in lambs by seeding a synthetic polyglycolic acid fiber matrix in vitro with fibroblasts and endothelial cells. METHODS. Mixed cell populations of endothelial cells and fibroblasts were isolated from explanted ovine arteries. Endothelial cells were selectively labeled with an acetylated low-density lipoprotein marker and separated from the fibroblasts using a fluorescent activated cell sorter. A synthetic biodegradable scaffold constructed from polyglycolic acid fibers was seeded with fibroblasts, which grew to form a tissue-like sheet. This tissue was subsequently seeded with endothelial cells, which formed a cellular monolayer coating around the leaflet. Using these constructs, autologous (n = 3) and allogenic (n = 4) tissue engineered leaflets were implanted in 7 animals. In each animal the right posterior leaflet of the pulmonary valve was resected and replaced with an engineered valve leaflet. RESULTS. All animals survived the procedure. Postoperative echocardiography demonstrated no evidence of stenosis and trivial pulmonary regurgitation in the autografts and moderate regurgitation in the allogenic valves. Collagen analysis of the constructs showed development of an extracellular matrix. Histologic evaluation of the constructs demonstrated

appropriate cellular architecture. CONCLUSIONS. This preliminary experiment showed that a tissue engineered valve leaflet constructed from its cellular components can function in the pulmonary valve position. Tissue engineering of a heart valve leaflet is feasible, and these preliminary studies suggest that autograft tissue will probably be superior to allogenic tissue.

MeSH Terms:

- Animals
- Bioprosthesis*
- Culture Techniques*
- Endothelium, Vascular/cytology
- Fibroblasts/cytology
- Heart Valve Prosthesis
- Heart Valves*/surgery
- Polyglycolic Acid
- Sheep

Substances:

- Polyglycolic Acid

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